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Home-mixed Fertilizers and Composts

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RALEIGH, N. C.

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THE NORTH CAROLINA

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AND

THE FERTILIZER CONTROL STATION

UNDER THE CONTROL OF THE

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RALEIGH, N. C.

Home-mixed Fertilizers and Composts.

By H. B. Battle, Director.

Introduction.—The following bulletin is issued to meet the requirements of the coming spring crop. A more complete publication will shortly be distributed. As the length of this forthcoming bulletin will not admit of its being sent to all the names on the Station's mailing list, it will be sent only to parties who request it. It is urgently advised that all interested in farming, in every section, should make application for the complete bulletin,* as it will contain discussions of important subjects and will include the plans and practices of no less than 150 farmers throughout the State who have made a success with home-mixing of fertilizers and composts.

The need of home-mixing of fertilizers and composts.—Every farmer should carefully study the needs of his soils, and find out the requirements of each field, systematically and rationally. Fertilizing applications should be carefully added to prevent waste of food materials and the consequent deterioration of the land. To do this, all home materials that may be of value in fertilizing applications should be preserved and utilized in home-made composts or mixtures. Stable manure should be carefully handled and preserved according to plans referred to in the complete bulletin mentioned above. The plan is recommended of adding one part of kainit to two parts of acid phosphate to the manure as it is made, and one pound and a half of this per animal per day is advised to be sprinkled upon the manure and litter as it is collected each day. Cotton seed should be saved and either returned to the soil or else exchanged for cotton-seed meal. This can be fed or else applied as a fertilizer for the coming crop. Straw and leaves from the forest can be used for bedding or litter in stables. Muck can also be saved and composted with stable manure. Ashes can be saved and utilized. It will be found, however, that it will be necessary to buy some fertilizing materials, and these principally are acid phosphate and some potash ingredients, such as kainit or muriate of potash. These should be combined with the materials saved at home, in the proportions stated in the formulas on the following pages.

How to proceed in home-mixing of fertilizers.—Fertilizing materials may be bought and used independently of the materials saved on the farm. They can be mixed in proportions to form a

* When making application, specify *Bulletin No. 139 Complete.*

regular fertilizer just as is done by the manufacturer, or they can be combined with stable manure or other material to form a compost. Many proportions suitable to various crops are given hereafter. The advantages of home mixing of fertilizing ingredients are that the proportions can be altered to suit individual soils and crops, and also that special ingredients can be used for these purposes It is not a difficult matter to mix these ingredients. It can be done on any rainy day and at an expense of about 50 cents per ton. The ingredients should be as fine and dry as possible, and if there are any lumps they should be mashed. A clean floor or hard ground can be used, and under shelter. The materials are weighed out in the proportion to form a fourth to half ton. They are then poured out in layers on top of each other and mixed with hoes from each side of the pile. A wagon body may be used for mixing a small quantity. When the mixture shows uniform color throughout, the mixing can be stopped. Smaller weights of ingredients especially should be most thoroughly mixed with the other ingredients in the pile. It is not absolutely necessary to weigh each ingredient, if scales be not convenient, as the bags containing them can be subdivided with sufficient accuracy for general purposes. Mixing can be done immediately before applying, if desired, and can be kept after mixing as long as convenient, except those containing nitrate of soda, which should be used soon after being mixed.

The advantages of compost-making.—The special advantages of compost-making are also that the proportions may be altered and special ingredients used, if desired. Another important consideration is that a large quantity of organic matter is thus applied to the soil, in which in many crops, such as clean corn and cotton culture, it is specially deficient. A particular benefit also in such a case is that the organic matter lightens up the soil and improves its mechanical condition, in addition to introducing the fertilizing ingredients contained in it. Another advantage is that it will act as a mulch in the soil and prevent the escape of moisture and thus prevent, in some degree, the bad results of long continued drought.

When to prepare composts.—This depends largely upon the materials used. If cotton seed be one of the ingredients, or leaf mold or other materials that should be fermented in order to change them into better character of plant food, then the material should remain in compost heap for four or five weeks or a sufficient time to kill the seed and prevent germination. The cotton seed hulls, too, by this change are made more available. If such materials are already in a well rotted and fermented condition it is not necessary that the fertilizing ingredients should be mixed with them at all. In such a case the fertilizing ingredients may be applied in the furrow with the stable manure, using the proportions given in the formulas to follow.

How and where to prepare the compost.—Where the materials require fermentation, or the manure is not well rotted, the

compost heap should be made. It should be prepared at a convenient place to the stable manure, and need not necessarily be under shelter.* A hard, compact soil is advised for this purpose. If cotton seed is one ingredient, a layer of stable manure is first put down, then a layer of cotton seed; upon this the acid phosphate, next cotton seed, then stable manure, then acid phosphate, then kainit, and repeat in the order named. The size of the layers and thickness will depend upon the quantity of compost desired to be made. Thirty pounds of cotton seed is the legal weight per bushel, and the same weight is used for stable manure. These materials can therefore be measured instead of weighed. Each layer should be wetted when put down, and the heap built up in conical shape and covered with rich earth to prevent the entrance of air, which will injuriously affect the fermentation. The heap may be examined from time to time, and if there is evidence of being too hot, water can be poured in to moisten it. At the time the compost is to be used, it should be chopped from top to bottom and thoroughly mixed. Other mixtures for composts can be made in the same way. Lime should not be mixed with stable manure, as it decomposes it. A limited quantity of ashes may be used, if they do not come in immediate contact wih the manure Rich earth should then be used to cover the heap.

Many farmers prefer to prepare numerous small heaps in different parts of the field, and use earth from the ditch banks in the preparation, considering that it is too much labor to haul this dirt to the barn-yard to add to the compost, and then haul it back. While this is true, still most of the dirt from ditch banks is hardly the best material to use for the purpose, and if it is not sufficiently rich, it should not be used at all. If it is sufficiently rich, and with much organic matter, and with little sand or loam, one can afford to haul the best of it to the barn-yard, where the larger compost heap is being made. In this way the heap can be better mixed and far better cared for, and the result will be much superior to the smaller heaps in the field, because the organic matter can be better decomposed by the stable manure.

How much to apply.—This will depend entirely upon the means and the intentions of the owner. It is a bad policy to apply too little. If the plants be not fed, they cannot give good yields. We would advise every farmer to measure first the amount of money that can be afforded for fertilizing applications. Select next the formulas with materials that may be thought better for the purpose and can be most conveniently secured. Then decide on the amount of application, on the basis of the cost rather than the actual weight. For ordinary staple crops upon average soils, the cost of fertilizers should be at least two to three dollars per acre. A larger quantity will give proportionately better returns. For most purposes, then, it should

* A convenient plan is to have a square rail pen made with 8-foot rails laid horizontally. Boards can be put inside to the height of a foot or two from the bottom. Composts can be made in this pen which can easily be covered. Stable manure can also be saved in such a pen.

not be forgotten that the larger the application the greater will be the crop yield.

How and when to apply.—If the application of compost is very large, it is advisable to apply half broadcast and the other half in the opening furrow, and bed on it, so as to mix it thoroughly with the soil. With a more moderate application it all should be applied in the furrow. In planting the seed, a good practice is that recommended by the Georgia Station—to add with the seed a small quantity of readily available fertilizer, so as to give plant food for the immediate needs of the young plants. For this purpose, 30 pounds of acid phosphate, 10 pounds nitrate of soda, and 60 pounds rich, dry dirt, are mixed carefully together and applied to each acre with the seed when sown, or with the plant when set. If these cannot conveniently be had, 50 to 75 pounds of an ammoniated fertilizer per acre may be used. In no case is it advised to put fertilizers immediately in contact or too near the seed or plant. In many cases, too close application injures the small plants, and a bad stand is the result. It must be remembered that the young rootlets, being very tender, will be destroyed, and the plants thus be killed, if they come in contact with the fertilizers. The use of grain drills for sowing fertilizers and grain together, often injuriously affects the stand of the grain. This is particularly the case with mixtures containing cotton-seed meal. This can be prevented by drilling the fertilizer previous to the seed, and across the direction of the latter.

Top-dressings.—A top-dressing for small grains and clover is of much value, particularly where the fertilizing application has not been thoroughly made at the time of planting. It is readily soluble and available to the plant. Several formulas for top-dressing are given on the pages following. Nitrate of soda is often used for this purpose, for cotton or corn, at the rate of 50 to 75 pounds per acre. It should be mixed with rich, dry earth and applied as a top-dressing when the plants are from six to eight inches high.

Do not apply fertilizers or composts too near the seed or plant.—Special attention should be given to this point. Besides being a danger to the small plants, as already mentioned, if the applications are too near, the roots will soon pass out of reach, and additional food will not be available. It should be remembered that roots of staple crops often measure as much as six to eight and even ten feet in length. Even the shorter roots spread beyond six or eight inches. The fertilizers and compost, consequently, should be applied so that they can readily be utilized by the longer as well as the shorter roots.

The use of stable manure.—Many farmers prefer to haul stable manure directly to the field as soon as made. This, doubtless, is a good plan for grass lands, and possibly small grains, but for cultivated crops all the manure should best be applied at the same time, and much loss by leaching and washing rains is thus prevented. Another advantage is, that by saving the manure in the heap, the litter

can be put in much better condition by the fermentation of the manure. In fact, this fermentation really improves the quality of the manure itself. To allow such fermentation to take place on top of the soil where the manure has been broadcasted, will inevitably result in loss of valuable nitrogen, and unless a crop is then growing on the land, much surface washing and leaching in hilly countries will be the result.

Stable manure composted with other ingredients, to be used in addition to those given in the formulas.—In many cases a larger quantity of stable manure may be available for use than is given in the proportions mentioned in the formulas below. Probably large quantities of muck, or rich earth from ditch-banks, etc., may also be procured. If such be the case, it is always advisable to use as much of these materials as is possible, in addition to the regular application given in the proportions in the following formulas. Stable manure is mixed with the muck, etc., in the proportion of one part of the former to four or five of the latter. Put down in layers, and moisten each layer. This should be mixed at least six weeks before using, and should be broadcasted and plowed or cultivated in. There is hardly any limit to the quantity of this mixture that can be profitably used per acre. If stable manure is not to be had, the muck, etc., can be made more available by the action of salt-slaked lime. The proportions to be used are as follows:

20 parts of muck, leaves, etc.
1 part of salt-slaked lime.

The salt-slaked lime can be made by taking 6 bushels of fresh building-lime, and slake with 1 bushel of salt dissolved in water. Chemical action soon disintegrates the muck. Marl or agricultural lime, and kainit, four of the former to one of the latter, are good substitutes for the salt-slaked lime. Wet each layer of the heap as put down. The lime should not be mixed with stable manure.

Cost of ingredients.—Below will be found an approximation of the cost of ingredients at the average interior point, say in the central portion of the State. These quotations cannot be exact for all localities. They are inserted here to give the probable cost to secure them. The quotation on acid phosphate is based on 13 per cent, and this grade is used invariably in the mixtures. It is not good policy to purchase a lower grade article, and it is really dearer to buy such material than a higher grade. No price is placed on the stable manure or the other home materials that should be saved without cost to the farmer.

Approximate Retail Cost of Fertilizing Ingredients in Central North Carolina.

Acid phosphate, 13 per cent	$14	per ton of	2,000 lbs.
Kainit, 12 per cent actual potash	14	"	"
Cotton-seed meal	20	"	"
Nitrate soda, 19 per cent ammonia	47	"	"
Cotton seed	10	"	"

Muriate potash, 50 per cent actual potash	$46	per ton of	2,000 lbs.
Fish scrap, 10 per cent ammonia	27	"	"
Sulphate of potash, 48 per cent actual potash	50	"	"
Tobacco stems	5	"	"

Formulas for home-mixed fertilizers and composts.—The formulas given in the following pages are intended as suggestions only. It is expected that the thoughtful farmer will vary the proportions, if he has found by experience that his soil requires it. In presenting these formulas, the endeavor has been to use materials of ordinary occurrence, or those that could be secured with the least difficulty. The proportions all approximate those that have been by actual practice found to give the best results. The quantities to be applied per acre should be governed by the cost as already explained.

FORMULAS FOR MIXTURES AND COMPOSTS.

[IF THE COMPOST MATERIALS ARE WELL ROTTED, IT IS NOT NECESSARY TO MIX THE FERTILIZERS WITH THEM, BUT APPLY INDEPENDENTLY.]

[THE PROPORTIONS NAMED SHOULD BE THE BASIS OF APPLICATION: AND AS MUCH STABLE-MANURE-AND-MUCK-COMPOST OR LIME-TREATED-COMPOST SHOULD BE APPLIED IN ADDITION AS IS POSSIBLE.]

[THE QUANTITIES TO BE APPLIED PER ACRE SHOULD BE GOVERNED ENTIRELY BY THE COST, WHICH SHOULD NOT BE LESS THAN $2 TO $3 PER ACRE.]

[IT IS BAD POLICY TO APPLY TOO LITTLE, AND THE INTENSIVE SYSTEM WILL ALWAYS PAY.]

[ACID PHOSPHATE SHOULD CONTAIN AT LEAST 13 PER CENT AVAILABLE PHOSPHORIC ACID].

Formulas for Cotton and Corn.

No. 1. Mixed Fertilizer.—Cost per ton (2,000 lbs.) $14.65. A useful formula. For cotton on clay or gravelly soils, the kainit may be reduced by 100 to 200 pounds, increasing the acid phosphate accordingly. The kainit may, in some instances, be reduced to 200 pounds (increasing the acid phosphate) if there is no danger of rust in cotton. A farmer who has used this last proportion, writes: "This formula that you gave me several years ago costs me generally from $15 to $16. I find it cheaper and better than fertilizers manipulated that cost me here about $21 to $22."

Acid phosphate	1,000 pounds.
Cotton-seed meal	600 pounds.
Kainit	400 pounds.
Total	2,000 pounds.

No. 2. Mixed Fertilizer.—Cost per ton, $20.15. A higher grade article than No. 1.

Acid phosphate	1,200 pounds.
Fish scrap	700 pounds.
Muriate potash	100 pounds.
Total	2,000 pounds.

No. 3. Mixed Fertilizer.—Cost per ton, $20.95. Also a high grade article.

Acid phosphate	1,000 pounds.
Cotton-seed meal	700 pounds.
Nitrate soda	100 pounds.
Muriate potash	200 pounds.
Total	2,000 pounds.

No. 4. Mixed Fertilizer.—Cost per ton, $14.65. A useful formula where these materials can be easily procured. The portions should be well mixed.

Acid phosphate	1,000 pounds.
Muriate potash	100 pounds.
Nitrate soda	100 pounds.
Cotton-seed meal	300 pounds.
Woods mold or rich earth	500 pounds.
Total	2,000 pounds.

No. 5. Mixed Fertilizer.—Cost per ton, $7.70. Tobacco stems may be easily procured in some localities. They should be as finely ground as possible.

Acid phosphate	600 pounds.
Tobacco stems	1,400 pounds.
Total	2,000 pounds.

No. 6. Compost.—Cost per ton, $7.25. A very serviceable compost, and one that will give general satisfaction. Cotton seed weighs 30 lbs. per bushel. Stable manure is allowed the same weight.

Stable manure	750 pounds.
Kainit	100 pounds.
Acid phosphate	400 pounds.
Cotton seed	750 pounds.
Total	2,000 pounds.

No. 7. Compost.—Cost per ton, $8.05. If manure is well rotted, the fertilizing ingredients can be applied separately, and not mixed with it. Be careful to have the ingredients well incorporated together.

Acid phosphate	650 pounds.
Muriate potash	50 pounds.
Nitrate soda	100 pounds.
Stable manure	1,200 pounds.
Total	2,000 pounds.

No. 8. Compost.—Cost per ton, $6.50. In this and other composts, if the manure is well rotted, the fertilizers can be applied separately. Muck can be used as a portion of manure.

Kainit	100 pounds.
Acid phosphate	400 pounds.
Stable manure	1,200 pounds.
Cotton-seed meal	300 pounds.
Total	2,000 pounds.

No. 9. Compost.—Cost per ton, $3.97. A low-priced but very efficient mixture. The bulk is of advantage, as it introduces much humus to the corn or cotton land. No. 19 can also be used in the same way.

Kainit	100 pounds.
Acid phosphate	300 pounds.
Nitrate soda	50 pounds.
Stable manure and woods mold	1,550 pounds.
Total	2,000 pounds.

No. 10. Compost.—Cost per ton, $5.15. Ashes should always be saved, protected from the weather. In making the compost, do not allow the ashes to touch the manure.

Acid phosphate	400 pounds.
Ashes (hardwood unleached)	300 pounds.
Nitrate soda	100 pounds.
Stable manure	800 pounds.
Rich earth or muck	400 pounds.
Total	**2,000 pounds.**

Formulas for Small Grain.

No. 11. Mixed Fertilizer.—Cost per ton, $17.90. Can be planted with the seed in the grain drill.

Acid phosphate	1,000 pounds.
Kainit	400 pounds.
Fish scrap	600 pounds.
Total	2,000 pounds.

No. 12. Mixed Fertilizer.—Cost per ton, $15.80. Cotton-seed meal sometimes injures the stand, if planted with the grain. The grain drill can be used if the fertilizer is planted first and across the planting drills.

Acid phosphate	1,000 pounds.
Cotton-seed meal	600 pounds.
Kainit	400 pounds.
Total	2,000 pounds.

No. 13. Mixed Fertilizer.—Cost per ton, $16.25. A mixture to utilize tobacco stems.

Commercial ammoniated fertilizer	1,500 pounds.
Tobacco stems	500 pounds.
Total	2,000 pounds.

No. 14. Mixed Fertilizer.—Cost per ton, $9.50. This utilizes the tobacco stems. Tobacco stalks, if chopped fine, could be used. Should preferably be used after peas or clover.

Acid phosphate	1,000 pounds.
Tobacco stems	1,000 pounds.
Total	2,000 pounds.

No. 15. Compost.—Cost per ton, $8.60. A very useful formula where cotton seed is available.

Acid phosphate	600 pounds.
Kainit	200 pounds.
Cotton seed	600 pounds.
Stable manure	600 pounds.
Total	2,000 pounds.

No. 16. Compost.—Cost per ton, $7.20. Muck can be used in part for the manure. This formula gives its best return after peas or clover.

Acid phosphate	700 pounds.
Muriate potash	100 pounds.
Stable manure	1,200 pounds.
Total	2,000 pounds.

No. 17. Compost.—Cost per ton, $7.20. Especially useful after clover or peas.

Acid phosphate	700 pounds.
Muriate potash	100 pounds.
Rich earth	600 pounds.
Stable manure	600 pounds.
Total	2,000 pounds.

No. 18. Compost.—Cost per ton, $2.80. Also best after peas or clover, as it contains too little nitrogen (or ammonia) for the required application.

Acid phosphate	300 pounds.
Stable manure	900 pounds.
Kainit	100 pounds.
Muck	700 pounds.
Total	2,000 pounds.

No. 19. Compost.—Cost per ton, $13.20. A very serviceable grain compost.

Acid phosphate	700 pounds.
Cotton-seed meal	600 pounds.
Stable manure	600 pounds.
Muriate potash	100 pounds.
Total	2,000 pounds.

Formulas for Tobacco.

No 20. Mixed Fertilizer.—Cost per ton, $22.85. This is a high-grade tobacco fertilizer, containing nearly 8 per cent of actual potash. To many who believe that tobacco requires so large a per cent of potash, this formula will be very useful. It will give universal satisfaction in eastern North Carolina. Applications should not be made too near the plants, as the cotton-seed meal, under certain conditions of weather, might have some injurious effect. The potash is in the best form for bright tobacco.

Acid phosphate	1,000 pounds.
Sulphate potash	300 pounds.
Cotton-seed meal	600 pounds.
Nitrate soda	100 pounds.
Total	2,000 pounds.

No. 21. Mixed Fertilizer.—Cost per ton, $15.80. While we do not recommend kainit as a source of potash for yellow tobacco, because it does not cure bright nor keep its color, still some may not have other materials at hand. Under such condition, this mixture will answer well. It can be used for the darker types. It should not be applied too close to the plants.

Acid phosphate	900 pounds.
Cotton-seed meal	600 pounds.
Kainit	500 pounds.
Total	2,000 pounds.

No. 22. Mixed Fertilizer.—Cost per ton, $21.05. This mixture will be found a valuable application, with 5½ per cent of potash. Very closely resembles No. 20 in other respects. A prominent tobacco grower writes in regard to this formula: "The crop made a fine growth, ripening nicely throughout the plant, producing a fine, smooth leaf and of good body and weight. While tobacco was diseased more than usual in this section with 'frog-eye,' I had but little in my crop. It was generally conceded that I produced the finest crop of tobacco in the neighborhood."

Acid phosphate	1,100 pounds.
Cotton-seed meal	600 pounds.
Nitrate of soda	100 pounds.
Sulphate of potash	200 pounds.
Total	2,000 pounds.

No. 23. Mixed Fertilizer.—Cost per ton, $12.50. This can be conveniently used where tobacco stems are available. The finer they are, the better.

Commercial ammoniated fertilizer	1,000 pounds.
Tobacco stems	1,000 pounds.
Total	2,000 pounds.

No. 24. Mixed Fertilizer.—Cost per ton, $9.20. A very serviceable mixture with tobacco stems. It will be found very effective. Its cheapness will enable the tobacco-grower to use a larger quantity than the more concentrated mixtures.

Acid phosphate	600 pounds.
Cotton-seed meal	200 pounds.
Tobacco stems	1,200 pounds.
Total	2,000 pounds.

No. 25. Mixed Fertilizer.—Cost per ton, $17.90. As kainit is here used, the formula will give better satisfaction on the heavy, dark tobaccos. It may also be used by those who have not found this form of potash unobjectionable.

Acid phosphate	800 pounds.
Kainit	600 pounds.
Fish scrap	600 pounds.
Total	2,000 pounds.

No 26. Compost.—Cost per ton, $9.70. On some cotton farms, tobacco is also used. The cotton seed can be prepared in a compost according to the proportions below. It will be found very serviceable.

Acid phosphate	600 pounds.
Sulphate of potash	100 pounds.
Cotton seed	600 pounds.
Stable manure	700 pounds.
Total	2,000 pounds.

No. 27. Compost.—Cost per ton, $8.65. The proportions of this compost omit cotton seed and use nitrate soda, a quick-acting ingredient.

Acid phosphate	600 pounds.
Nitrate of soda	100 pounds.
Kainit	300 pounds.
Stable manure	1,000 pounds.
Total	2,000 pounds.

No. 28. Compost.—Cost per ton, $9.05. This will be found a very desirable compost, and one that will give satisfaction. Its cheapness also enables one to use a much larger quantity. In this formula, as well as the others, if the stable manure is well rotted, it is not necessary to mix the other ingredients with it.

Acid phosphate	600 pounds.
Nitrate soda	100 pounds.
Sulphate of potash	100 pounds.
Stable manure	1,200 pounds.
Total	2,000 pounds.

No. 29. Compost.—Cost per ton, $10.75. Where fish scrap is available, this will prove a very acceptable formula. Its grade is somewhat better than No. 28.

Stable manure	1,000 pounds.
Acid phosphate	600 pounds.
Sulphate of potash	100 pounds.
Fish scrap	300 pounds.
Total	2,000 pounds.

Formulas for Grass.

No. 30. Mixed Fertilizer.—Cost per ton, $19.10. A useful formula for lawns, but can be used also for grass lands, particularly as a top-dressing.

Acid phosphate	600 pounds.
Cotton-seed meal	600 pounds.
Kainit	600 pounds.
Nitrate of soda	200 pounds.
Total	2,000 pounds.

No. 31. Mixed Fertilizer.—Cost per ton, $16.70. The materials more commonly at hand are here used. It can be used for grass lands or lawns, as a regular application or a top dressing.

Acid phosphate	500 pounds.
Cotton-seed meal	900 pounds.
Kainit	600 pounds.
Total	2,000 pounds.

Formulas for Vegetables.

No. 32. Mixed Fertilizer.—Cost per ton, $16.40. This is a good all-round mixture for garden vegetables. The materials, however, are not such to force an early crop, so desirable for trucking purposes. No. 38 is better for that purpose.

Acid phosphate	500 pounds.
Cotton-seed meal	800 pounds.
Kainit	700 pounds.
Total	2,000 pounds.

No. 33. Mixed Fertilizer.—Cost per ton, $18.20 The ordinary ammoniated fertilizer can be improved for vegetables by increasing the percentage of ammonia and potash, as in the following mixture. This will give far better results for vegetables:

Commercial ammoniated fertilizer	1,000 pounds.
Cotton-seed meal	400 pounds.
Kainit	600 pounds.
Total	2,000 pounds.

No. 34. Mixed Fertilizer.—Cost per ton, $6.80. Where tobacco stems are available, they can be mixed in the proportion below with acid phosphate.

Acid phosphate	400 pounds
Tobacco stems	1,600 pounds.
Total	2,000 pounds.

No. 35. Mixed Fertilizer.—Cost per ton, $12 50. A formula to utilize tobacco stems for vegetables They must be mixed with other ingredients to give their best effect.

Commercial ammoniated fertilizer	1,000 pounds.
Tobacco stems	1,000 pounds.
Total	2,000 pounds.

No. 36. Mixed Fertilizer.—Cost per ton, $21.00. This formula is especially for beans and peas, as they require a smaller percentage of ammonia. It is intended for trucking purposes or those requiring early maturity.

Acid phosphate	1,200 pounds.
Cotton-seed meal	450 pounds.
Nitrate soda	100 pounds.
Muriate potash	250 pounds.
Total	2,000 pounds.

No. 37. Mixed Fertilizer.—Cost per ton, $27.65 —Especially for Irish potatoes, although it can be used for most trucking crops, except peas and beans and cabbage, when Nos. 36 and 39 give better results For early crops. A correspondent who used this formula, excepting tankage in place of fish scrap, reports a yield of 150 bushels of Irish potatoes per acre with ½ ton of the mixture. Stable manure is objectionable for Irish potatoes as it promotes "scab." Chemical fertilizers are therefore better.

Acid phosphate	800 pounds.
Fish scrap	600 pounds.
Nitrate soda	300 pounds.
Muriate potash	300 pounds.
Total	2,000 pounds

No. 38. Mixed Fertilizer.—Cost per ton, $25.55. A very popular and tried mixture, especially for Irish potatoes and other vegetables, as mentioned under No. 37. It will give satisfaction. It is for early crops and for trucking purposes. A grower writes, regarding this mixture, "The result of your formula you furnished me about two years ago is as follows: I tested it along with other fertilizers, costing me $42.50 cash, and got as good if not a better crop of Irish potatoes from your formula, which only cost me $26. I got one of our best farmers here to try a ton of your formula alongside of a fertilizer which cost him $42.50 cash, or $45 on time, and he says he could not see any difference in the

crop of Irish potatoes, only he saved $16.50 in the cost of the two fertilizers, which he considered a big item to farmers. I use it exclusively."

Acid phosphate	800 pounds.
Cotton-seed meal	600 pounds.
Nitrate soda	300 pounds.
Muriate potash	300 pounds.
Total	2,000 pounds.

No. 39. Mixed Fertilizer.—Cost per ton, $25.85. The proportions are especially suitable for cabbage and other leafy vegetables. The mixture is intended for early forcing for trucking crops.

Acid phosphate	700 pounds.
Cotton-seed meal	700 pounds.
Muriate potash	300 pounds.
Nitrate soda	300 pounds.
Total	2,000 pounds.

Formulas for Sweet Potatoes.

No. 40. Mixed Fertilizer.—Cost per ton, $20.90. A high grade mixture, containing 8 per cent of potash. Sweet potatoes do not require a large amount of ammonia.

Acid phosphate	1,000 pounds.
Muriate potash	300 pounds.
Cotton-seed meal	700 pounds.
Total	2,000 pounds.

No. 41. Mixed Fertilizer.—Cost per ton, $18.80. This utilizes cotton-seed hull ashes, a valuable material where it can be procured. The grade of the mixture is not so high as No. 40.

Acid phosphate	900 pounds.
Cotton-seed meal	600 pounds.
Cotton-seed hull ashes	500 pounds.
Total	2,000 pounds.

No. 42. Mixed Fertilizer.—Cost per ton, $15.50. The materials here used can easily be procured. This mixture will be found very useful for home gardening or for field use.

Acid phosphate	700 pounds.
Kainit	800 pounds.
Cotton-seed meal	500 pounds.
Total	2,000 pounds.

No. 43. Mixed Fertilizer.—Cost per ton, $18.20. Where it is desired that a commercial fertilizer be used, it should be mixed with kainit or some potash salt, and cotton seed meal. The below is a convenient formula. Sweet potatoes require a higher per centage of potash than is contained in the usual staple fertilizer.

Commercial ammoniated fertilizer	1,200 pounds.
Kainit	600 pounds.
Cotton-seed meal	200 pounds.
Total	2,000 pounds.

Formulas for Peanuts.

No. 44. Mixed Fertilizer.—Cost per ton, $16.60. A convenient and useful formula where fish scrap can be procured. Peanuts require lime in addition, if soil does not contain it. From 300 to 600 lbs. slaked lime (agricultural lime) should be used per acre in the furrow. This will prevent "pops."

Acid phosphate	900 pounds.
Kainit	700 pounds.
Fish scrap	400 pounds.
Total	2,000 pounds.

No. 45. Mixed Fertilizer.—Cost per ton, $15.20. This formula will be found very serviceable and convenient to procure. Use lime in addition, as in No. 40.

Acid phosphate	1,000 pounds.
Kainit	600 pounds.
Cotton-seed meal	400 pounds.
Total	2,000 pounds.

No. 46. Mixed Fertilizer.—Cost per ton, $19.80. A high grade mixture with larger percentage than the foregoing. It is best to use lime in addition, as mentioned under No. 40.

Acid phosphate	1,400 pounds.
Muriate potash	200 pounds.
Fish scrap	400 pounds.
Total	2,000 pounds.

Formulas for Fruit.

No. 47. Mixed Fertilizer.—Cost per ton, $16.40. Where other materials cannot be had, the following will make a good mixture for tree fruits growing, and for small fruits.

Acid phosphate	500 pounds.
Kainit	700 pounds.
Cotton-seed meal	800 pounds.
Total	2,000 pounds.

No. 48. Mixed Fertilizer.—Cost per ton, $24.20. This is a better formula than the preceding, and of higher grade. It is for small fruits, and especially for forcing for an early market. It is also useful for tree fruits when growing. It contains 8 per cent. potash. For a higher percentage, see No. 49. For tree fruits, the application should be graduated according to the age of the trees. Applications should be made evenly over a circle as far as the branches extend.

Acid phosphate	800 pounds.
Cotton-seed meal	700 pounds.
Nitrate soda	200 pounds.
Muriate potash	300 pounds.
Total	2,000 pounds.

No. 49. Mixed Fertilizer.—Cost per ton, $25.20. For a quick acting fertilizer for early small fruits this mixture will be very useful. It contains 10 per cent. of potash. Some prefer to use sulphate potash in place of muriate. The former is claimed to give a sweeter berry and a higher color. The mixture can also be used for orchard fruits. The applications should be graduated according to the age of the tree. Apply evenly in a circle as far as the branches extend.

Acid phosphate	900 pounds.
Cotton-seed meal	500 pounds.
Nitrate soda	200 pounds.
Muriate potash	400 pounds.
Total	2,000 pounds.

No. 50. Mixed Fertilizer.—Cost per ton, $21.90. A mixture like this, high in potash (10 per cent.) and phosphoric acid, and low in nitrogen (ammonia), is specially to be commended for orchard fruits in bearing.

Acid phosphate	1,100 pounds.
Cotton-seed meal	500 pounds.
Muriate potash	400 pounds.
Total	2,000 pounds.

Formulas for Cowpeas.

No. 51. Mixed Fertilizer.—Cost per ton, $15.20. Ordinarily cowpeas will not need nitrogen (or ammonia), but in poorer soils some is serviceable to start the growth, after which it begins to take advantage of the atmospheric nitrogen.

Acid phosphate	1,000 pounds.
Kainit	600 pounds.
Cotton-seed meal	400 pounds.
Total	2,000 pounds.

No. 52. Mixed Fertilizer.—Cost per ton, $14.00. On the better class of soils, especially if peas have previously been grown, the nitrogen application can be dispensed with. The equivalent in muriate potash to kainit may be used. Muriate is four times as strong as kainit.

Acid phosphate	1,300 pounds.
Kainit	700 pounds.
Total	2,000 pounds.

Formulas for Top-Dressings.

No. 53. Mixture.—Cost per ton, $6.80. A dressing of lime is oftentimes of value on clover grasses or small grain. When combined with kainit, the chlorides of the latter form a chemical combination with the lime, which reacts with beneficial results on the soil and the growing crops. The lime is valued at $5.00 per ton. The potash also is of benefit.

Air-slaked lime (agricultural lime)	1,600 pounds.
Kainit	400 pounds.
Total	2,000 pounds.

No. 54. Nitrate Soda.—Cost per 50 lbs., $1.17. This quantity is for one acre. Can be used for cotton or corn, or small grains or grasses. A very soluble and useful material. It should be well mixed with dry earth to facilitate an even application. The quantity in some cases might be increased to 75 pounds.

Nitrate soda	50 pounds.

No. 55. Mixture.—Cost per 150 lbs., $1.05. This quantity is for one acre. A good application for clover, or mixed grasses containing clover, or even grass or small grains. The land plaster (gypsum) contained in the acid phosphate is of much service as an indirect fertilizer. The phosphoric acid and potash add to this value as a direct fertilizer. The quantity per acre may be increased in proportion.

Acid phosphate	100 pounds.
Kainit	50 pounds.
Total	150 pounds.

No. 56. Mixture.—Cost per 200 lbs., $1.70. This quantity is for one acre. It is a convenient one for grass and small grain.

Acid phosphate	50 pounds.
Cotton-seed meal	100 pounds.
Kainit	50 pounds.
Total	200 pounds.

No. 57. Mixture.—Cost per ton, $19.10. This is the same as No. 31. It is very useful for grasses. See also No. 30.

Acid phosphate	500 pounds.
Cotton-seed meal	900 pounds.
Kainit	600 pounds.
Total	2,000 pounds.